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Ongena, Steven ; Popov, Alexander ; van Horen, Neeltje

Abstract: Using proprietary data on banks' monthly securities holdings, we find that during the European sovereign debt crisis, domestic banks in fiscally stressed countries were considerably more likely than foreign banks to increase their holdings of domestic sovereign bonds in months with relatively high domestic sovereign bond issuance. This effect is stronger for state-owned banks and for banks with low initial holdings of domestic sovereign bonds, and it is not fuelled by Central Bank liquidity provision. Our results point to a "moral suasion" mechanism, and they are not driven by concurrent risk-shifting, carry-trading, regulatory compliance, or shocks to investment opportunities.

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The Invisible Hand of the Government: Moral Suasion during the European Sovereign Debt Crisis[†]

By Steven Ongena, Alexander Popov, and Neeltje Van Horen*

Using proprietary data on banks' monthly securities holdings, we show that during the European sovereign debt crisis, domestic banks in fiscally stressed countries were considerably more likely than foreign banks to increase their holdings of domestic sovereign bonds during months when the government needed to roll over a relatively large amount of maturing debt. This result cannot be explained by risk shifting, carry trading, or regulatory compliance. Domestic banks that received government support, are small, or with weaker balance sheets were particularly susceptible to "moral suasion," while governance of banks played less of a role. (*JEL* D72, E62, G21, G28, H11, H63).

Between the onset of the global financial crisis in 2008 and 2013, domestic sovereign bond holdings of euro area banks' increased from about 2 percent to more than 5 percent of total assets (Figure 1). This increase was largely driven by banks in countries under fiscal stress, namely Greece, Ireland, Italy, Portugal, and Spain (hereafter "stressed countries" or "GIIPS"), whose relative holdings of domestic sovereign bonds tripled during this period (Figure 2). Crucially, while initially both domestic and foreign banks in these countries were increasing their holdings of domestic

* Ongena: University of Zurich, Plattenstrasse 32, CH-8032 Zürich, Switzerland, Swiss Finance Institute, KU Leuven and CEPR (email: steven.ongena@bf.uzh.ch); Popov: European Central Bank, Sonnemannstrasse 20, D 60314 Frankfurt am Main, Germany (email: alexander.popov@ecb.europa.eu); Van Horen: Bank of England, Threadneedle Street, EC2R 8AH London, United Kingdom, and CEPR (email: neeltje.vanhoren@bankofengland.co.uk). Simon Gilchrist was coeditor for this article. We thank three anonymous referees, Anat Admati (discussant), Patrick Augustin (discussant), Allen Berger, Catagay Bircan, Diana Bonfim, Stijn Claessens (discussant), Santiago Carbo-Valverde (discussant), Paolo Colla (discussant), Stefania D'Amico, Mathias Fleckenstein (discussant), Linda Goldberg, Rajkamal Iyer, Mariassunta Giannetti, Anil Kashyap, Luc Laeven, Andre Silva, Marti Subrahmanyam, Gregory F. Udell, Deniz Yavuz (discussant), seminar participants at the Banca d'Italia, the Banco de Portugal, the Bank of England, De Nederlandsche Bank, the European Central Bank, the International Monetary Fund, the Leibniz-Institut für Wirtschaftsforschung Halle (IWH), the London School of Economics, University of Maryland, Renmin University of China, VU University Amsterdam, and conference participants at the 2017 American Economic Association Meetings in San Francisco, the Bocconi CAREFIN Conference "Tomorrow's Bank Business Model: How Far Are We from the New Equilibrium?" in Milano, the second Annual Chicago Financial Institutions Conference in Chicago, the 18th International Banking Conference on the "The Future of Large Internationally Active Banks" in Chicago, the 26th Annual Utah Winter Finance Conference in Cliff Lodge, the ninth Swiss Winter Conference on Financial Intermediation in Lenzerheide, the third International Conference on Sovereign Bond Markets in New York, the 2016 Western Finance Association Conference in Park City, the 2016 Wolpertinger Conference in Verona, the 2016 ETH Risk Day in Zurich, and the 2016 IBEFA Summer Meetings in Portland for helpful comments, Francesca Barbiero and Andrea Fabiani for excellent research assistance, Martijn Boermans for help collecting the data on maturing debt, and Victoria Ivashina for sharing her data with us. Ongena acknowledges financial support from ERC ADG 2016–GA 740272 lending. The opinions expressed herein are those of the authors and do not necessarily reflect those of the Bank of England, the ECB, or the Eurosystem.

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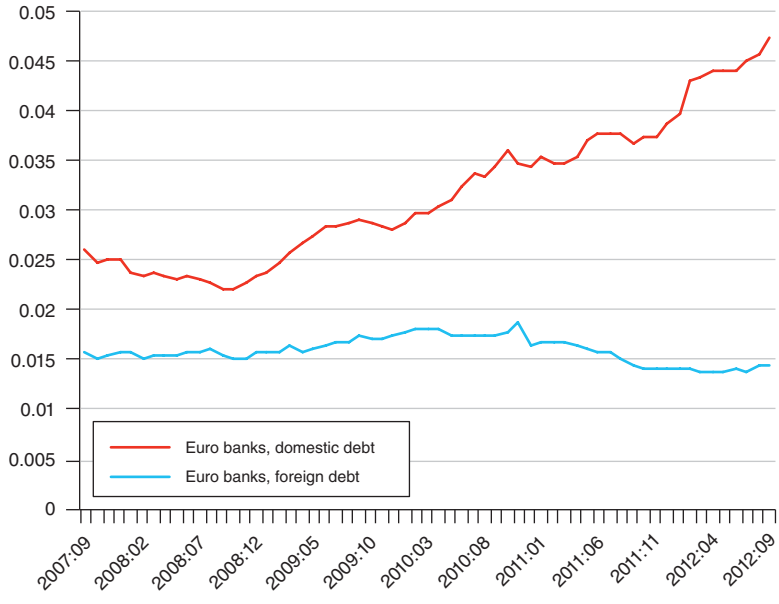

FIGURE 1. DOMESTIC AND FOREIGN SOVEREIGN BOND HOLDINGS: ALL EURO AREA BANKS

Notes: Average holdings of domestic and foreign sovereign bonds, divided by total assets, for 207 banks in 11 euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain) for the period September 2007–September 2012.

Source: IBSI

sovereign debt, after the start of the sovereign debt crisis in May 2010 domestic banks' holdings continued rising at an even faster pace—reaching 9 percent of total bank assets—while foreign banks' holdings of domestic sovereign debt declined and returned to a level predating the start of the global financial crisis (Figure 3).

This development has led both academics and policymakers to speculate that the rapidly increasing exposure of domestic banks in stressed countries to their sovereign was at least in part the result of "moral suasion," whereby governments under fiscal stress pressure their banks to purchase additional amounts of domestic sovereign bonds because market demand is weak. The need to do so stems from the fact that the government's inability to roll over its debt would damage its credibility and push sovereign bond yields up, raising debt refinancing costs.[1] In response, banks may choose to respond to this pressure if they are locked in a long-term relationship with the government where it is implicitly understood that current favors are reciprocated in the future, or because they feel it is their "moral" or "patriotic" duty to help the government in times of fiscal stress. Furthermore, an undersubscribed

[1] For example, after the undersubscribed auction for UK government bonds (gilts) on March 25, 2009, gilt prices slumped, the UK pound weakened against the US dollar and the euro, the opposition accused the government of losing control of public finances, and media commentators said the gilt failure further undermined the Prime Minister's reputation for economic competence ("Alarm as government debt auction fails," *The Guardian*, March 25, 2009 https://www.theguardian.com/business/2009/mar/25/uk-economic-rescue-in-crisis).

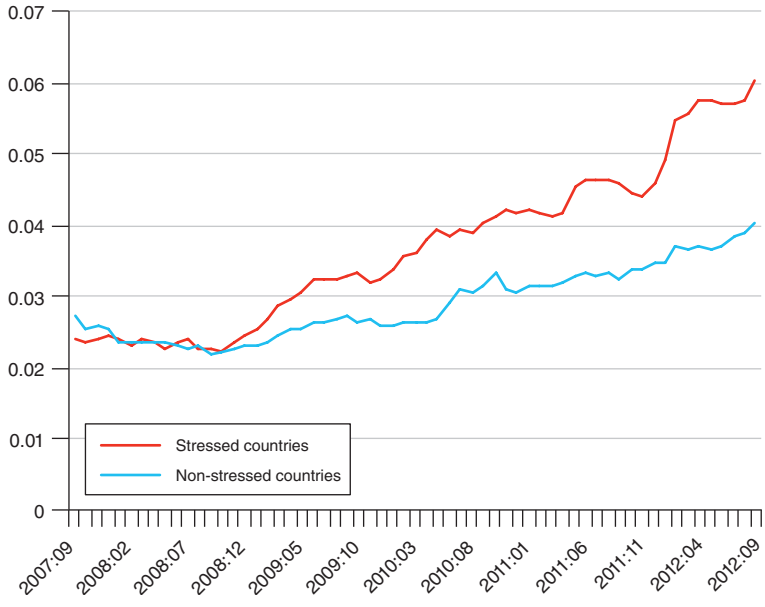

FIGURE 2. DOMESTIC SOVEREIGN BOND HOLDINGS: STRESSED VERSUS NON-STRESSED COUNTRIES

Notes: Average holdings of domestic and foreign sovereign bonds, divided by total assets, for 207 banks in 11 euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain) for the period September 2007–September 2012.

Source: IBSI

auction would imply higher sovereign spreads. This would directly translate into higher funding costs for banks, giving them another incentive to cooperate.

It is, however, still an open question whether moral suasion indeed took place during the European sovereign debt crisis. While a number of recent papers present evidence consistent with this idea (e.g., Battistini, Pagano, and Simonelli 2014; Acharya and Steffen 2015; Horváth, Huizinga, and Ioannidou 2015; De Marco and Macchiavelli 2016; Altavilla, Pagano, and Simonelli 2017; Ohls 2017; and Becker and Ivashina 2018), it is intrinsically difficult to tightly identify the "moral suasion" channel and to separate it from other mechanisms leading domestic banks to purchase domestic sovereign bonds in times of fiscal stress, such as risk shifting.

In this paper, we introduce a novel identification strategy which—in combination with a novel high-frequency dataset—allows us for the first time to convincingly identify the moral suasion channel. The previous literature typically identifies moral suasion by differentiating among banks depending on the extent of government control (e.g., state ownership) and by examining how this margin influences their behavior. Our identification strategy relies instead not only on exploiting differences between banks in their perceived likelihood to respond to pressure from the government but adds another layer of identification by also exploiting month-on-month fluctuations in the amount of sovereign debt that is maturing and therefore needs to be refinanced during times of severe fiscal stress. Adding this additional layer is

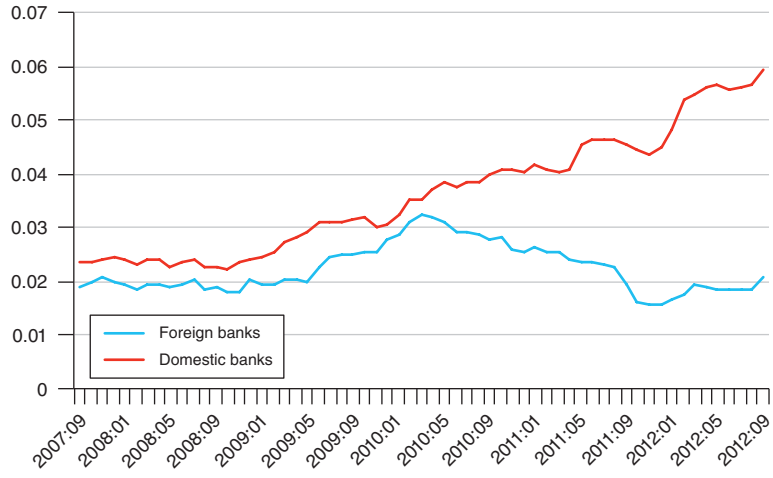

FIGURE 3. DOMESTIC SOVEREIGN BOND HOLDINGS: DOMESTIC VERSUS FOREIGN BANKS IN STRESSED COUNTRIES

Notes: Average holdings of domestic sovereign bonds, divided by total assets, for 46 domestic banks and 14 foreign banks in five stressed euro area countries (Greece, Ireland, Italy, Portugal, and Spain) for the period September 2007–September 2012.

Source: IBSI

critical to cleanly distinguish moral suasion from other drivers behind the increased demand for domestic sovereign debt during times of fiscal stress.

We find that during the acute phase of the sovereign debt crisis, domestic banks (that are arguably more susceptible to "moral suasion" by their own government) were substantially more likely to purchase domestically issued sovereign debt than foreign banks during months when the government had to roll over a relatively large amount of sovereign debt. This divergence in behavior for these two groups of banks did not take place outside of the period of the sovereign debt crisis. This effect is not only statistically significant but also economically relevant. During months with relatively higher government refinancing need, and compared with foreign banks, domestic banks increased their holdings of domestic sovereign bonds by 7.1 percentage points, corresponding to 0.46 sample standard deviations.

Exploiting differences between domestic banks, we also find that the effect is particularly strong for banks that received government support in the past, as well as for banks that were smaller, less well capitalized, and had a lower ratio of liquid assets to total assets. We do not find that state ownership or political affiliation matters. This suggests that moral suasion is not so much the result of a natural consequence of the governance relationship between banks and governments, but is driven by weaker banks that either owe the government a favor, or are trying to get on good terms with their government in anticipation of future assistance.

Our identification strategy exploits three typical features of sovereign bond markets in advanced countries. First, the main determinant of newly issued sovereign debt is the amount of maturing sovereign debt. Second, the amount of maturing

sovereign debt is strappingly predetermined because it is the outcome of choices typically made many years ago by previous governments. Third, the amount of maturing debt varies greatly on a month-on-month basis.[2] This month-on-month variation is present in all countries and characterizes sovereign debt markets before, during, and in the aftermath of the sovereign debt crisis (see Figure 4).[3]

Therefore, the first building block of our identification strategy is the conjecture that during the sovereign debt crisis, and in months when the amount of maturing debt is relatively high, the government has a more pressing need to sway banks to purchase domestic sovereign bonds. Importantly, such month-on-month fluctuations in the government's needs to roll over maturing debt can be viewed as a source of plausibly exogenous variation in the need of the government to find investors for the debt it needs to place and hence, its urgency to exert moral suasion. Because the amount of maturing debt is predetermined, it is also exogenous to current economic conditions, as well as to banks' current demand for domestic sovereign debt.

The second step in our identification strategy exploits the idea (as others in the literature have done) that some banks are more likely to be swayed by the domestic government than others. This difference is most obvious when comparing domestic and foreign banks. Domestic banks are more likely to be swayed than foreign banks because domestic banks have more to lose in terms of funding costs if an auction should fail, as their funding costs are more closely tied to that of the sovereign compared to the funding costs of foreign banks present in that same country. Furthermore, they are more likely, at some point, to need assistance from the government and are more vulnerable to explicit and implicit threats if they refuse to cooperate (Romans 1966, Reinhart and Sbrancia 2015). Finally, they are also more likely to feel a moral obligation or patriotic duty toward their government.[4]

Our identification strategy thus relies on assessing the differences in net purchases of domestic sovereign debt between "high-need" and "low-need" months during a period of fiscal stress for domestic banks (the treatment group) relative to foreign banks (the control group). We define a high-need month to be a month in which the total amount of maturing debt is above the country-specific median for the applicable sample period. We focus on Greece, Ireland, Italy, Portugal, and Spain during the acute phase of the sovereign crisis for each respective country. Our hypothesis is that if a moral suasion channel is operational, domestic banks will be more likely than foreign banks to purchase domestic sovereign bonds during high-need months, while these two types of banks should not behave differently during low-need months.

Taking this empirical strategy to the data requires a bank-level dataset that fulfills two criteria: changes in banks' holdings of domestic sovereign bonds—as well as various shocks to banks' balance sheets—need to be observed with a *monthly frequency*, and there needs to be substantial variation in bank ownership allowing

[2] For example, during the height of the crisis, €62.7 billion worth of Italian debt matured in September 2011, but only €15.7 billion in October 2011.

[3] Data on maturing debt come from the Eurosystem Securities Database.

[4] We later differentiate, within the group of domestic banks, between banks that are under the influence of the government and those that are not, as well as between weak and strong banks, in order to examine which type of banks are more likely to be morally swayed by their government.

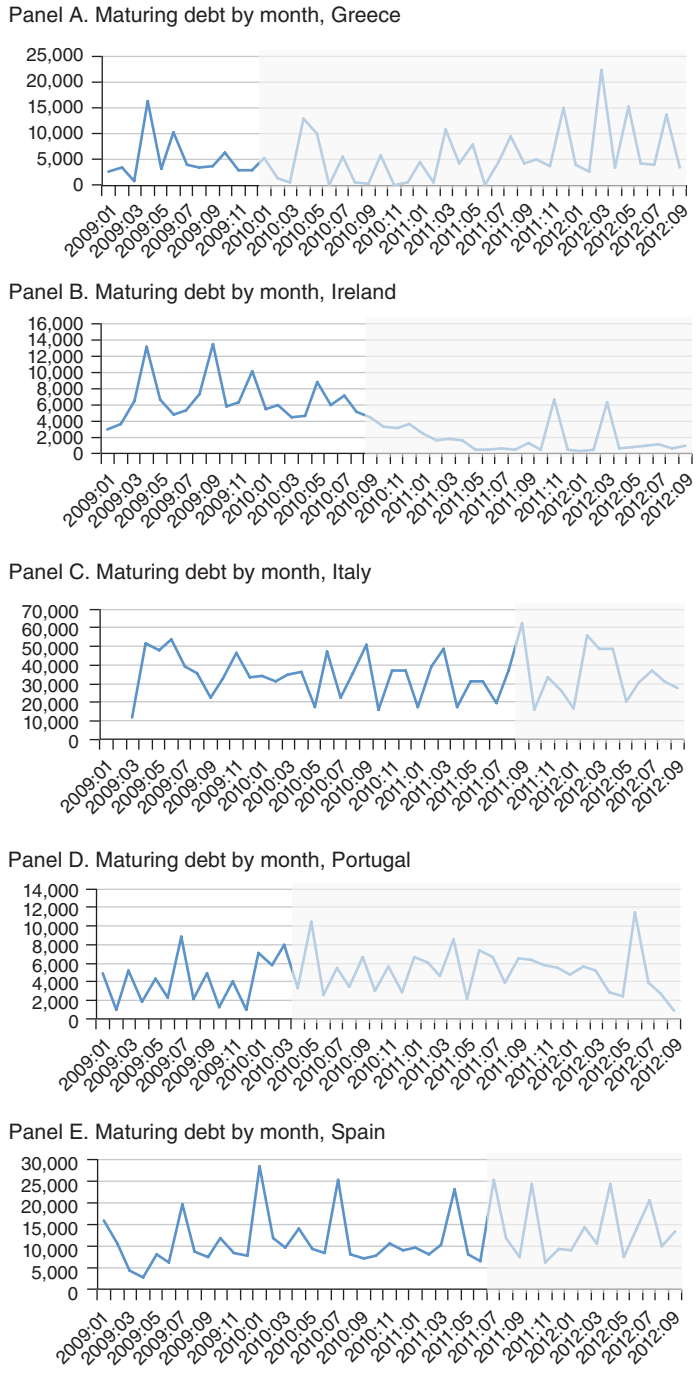

FIGURE 4. MATURING DEBT BY MONTH: STRESSED COUNTRIES

Notes: Amount of sovereign bonds, in millions of euros, maturing during each month between January 2009 and September 2012. Shaded areas represent the high-risk period (starting in January 2010 in the case of Greece, in September 2010 in the case of Ireland, in September 2011 in the case of Italy, in April 2010 in the case of Portugal, and in July 2011 in the case of Spain).

Source: Bloomberg

the econometrician to distinguish between domestic and foreign, as well as between different types of domestic banks. We employ the Individual Balance Sheet Statistics (IBSI) dataset of the European Central Bank (ECB), the first such dataset to have been made available to researchers. This new and unique high-frequency data source allows us to use end-of-month data on assets and liabilities, starting in January 2009, for 46 domestic and 14 foreign banks active in the five stressed countries. As such, it fulfills both criteria, making it possible to bring our novel identification strategy to the data.

The key advantage of our month-on-month identification strategy is that it allows us to include bank fixed effects and monthly bank balance sheet characteristics, thus controlling both for unobservable time-invariant, as well as for observable time-varying, bank-specific factors that can impact the decision of a bank to buy domestic sovereign bonds during periods of elevated fiscal stress such as risk shifting, carry-trading, regulatory compliance, and differences in investment opportunities. At the same time, it also makes it possible to include country $\times$ month fixed effects, which enables us to control for unobservable time-varying country-specific factors, such as economic conditions or sovereign creditworthiness.

We run a number of additional tests to put further rigor to the correct interpretation of the results. We show that the differential behavior between domestic and foreign banks during high-need months versus low-need months is not accompanied by an increase in bank holdings of foreign sovereign bonds or private debt securities, and that it is not present in countries under no fiscal stress. We also show that our results are not driven by domestic banks acting as primary dealers, by *monthly* fluctuations in banks' incentives to shift risk or to comply with regulatory changes, or by shocks to their net worth or investment opportunities. Finally, we show that our results cannot be explained by moral suasion by foreign regulators, or by the ECB's extraordinary provision of liquidity during the crisis.

Our paper most directly relates to the recent literature on the sovereign-bank "doom loop" (Acharya, Drechsler, and Schnabl 2014; Gennaioli, Martin, and Rossi 2014; and Farhi and Tirole 2018). This literature has proposed several explanations for the rise in banks' domestic sovereign bond holdings, such as creditor discrimination (Broner et al. 2014), risk shifting (Uhlig 2014, Drechsler et al. 2016), gambling for resurrection (Crosignani 2017), carry trading (Acharya and Steffen 2015), or government pressure at times when fiscal stress limits investors' demand (Chari, Dovis, and Kehoe 2016). Our paper adds to this literature by tightly identifying the latter mechanism.

Furthermore, our paper adds to the empirical literature on the impact of political factors on banks' performance and business decisions. A vast literature building on the seminal work of La Porta, Lopez-De-Silanes, and Shleifer (2002) shows that government ownership gives rise to politically motivated lending decisions.[5] In addition, a number of papers have shown that political interests can affect the timing of banking deregulation (Kroszner and Strahan 1999), delay foreclosures on mortgages (Agarwal et al. 2018), and lead to a delay in the release of news about

[5] See, among others, Sapienza (2004); Dinç (2005); Khwaja and Mian (2005); Micco, Panizza, and Yañez (2007); Claessens, Feijen, and Laeven (2008); and Shen and Lin (2012).

problems in the banking sector (Brown and Dinç 2005, Imai 2009, Liu and Ngo 2014) as well as to higher risk taking (Iannotta, Nocera, and Sironi 2013). Our paper adds to this literature by documenting that government refinancing needs in times of fiscal stress affect the composition of domestic banks' securities portfolios by pressuring them to keep purchasing domestic sovereign bonds.

I. Empirical Methodology

The goal of this paper is to study whether during the European sovereign debt crisis governments under fiscal stress pressured or colluded with "their" banks to purchase their own sovereign debt because of limited demand by other investors (moral suasion). To this end, we exploit a novel dataset collected by the ECB that captures monthly balance sheet data of European banks (we will describe the data in more detail in the next section). We use these data to examine banks' net purchases of securities issued by the domestic sovereign over the period January 2009–September 2012.[6] This period includes both the period preceding the sovereign debt crisis ("low-risk" period) and the sovereign debt crisis ("high-risk" period). The monthly frequency of the data allows us to employ a difference-in-difference-in-differences type of methodology, whereby we compare the behavior of banks that are more and less likely to be swayed by the government during months in which the government's need to sway banks to support it is plausibly high, relative to months of low such need. Effectively, we compare in one regression the differential behavior of domestic and foreign banks in the pre-crisis (low risk) environment where we do not expect moral suasion to play a role, with their behavior during the sovereign debt crisis where we do expect moral suasion to play a role during months of high need.

We first identify, for each of the five stressed countries in the dataset, the acute phase of the sovereign debt crisis. As is evident from Figure 5, sovereign debt problems did not arise at the same time in the five countries. While in Greece spreads already started to increase in the beginning of 2010, spreads in Italy and Spain only started to really take off in mid-2011. To capture as adequately as possible the perception in the market of significant concerns as regards the sovereign, we use for each country as the start of the high-risk period the first month when the country's average credit default swap (CDS) spread on a 10-year sovereign bond breaches the 300-basis points (bps) mark and stays there. This means that for Greece, the high-risk period starts in January 2010; for Ireland, in September 2010; for Italy, in September 2011; for Portugal, in May 2010; and for Spain, in August 2011. We end the sample period for all countries in September 2012, the month during which the details of the Outright Monetary Transactions (OMT) Program of the ECB were announced.[7,8] We show in

[6] January 2009 is the first month for which comprehensive data on maturing debt are available.

[7] The OMT Program was first hinted at by ECB President Mario Draghi in a speech at the Global Investment Conference in London on July 26, 2012, in which he vowed to do "whatever it takes" to keep the Eurozone together. https://www.ecb.europa.eu/press/key/date/2012/html/sp120726.en.html.

[8] We let our sample period end here because even though stress in government bond markets subsided, the period after Draghi's speech is still fundamentally different from the pre-sovereign debt crisis. As a result, comparing only with the period directly preceding the sovereign debt crisis is more appropriate.

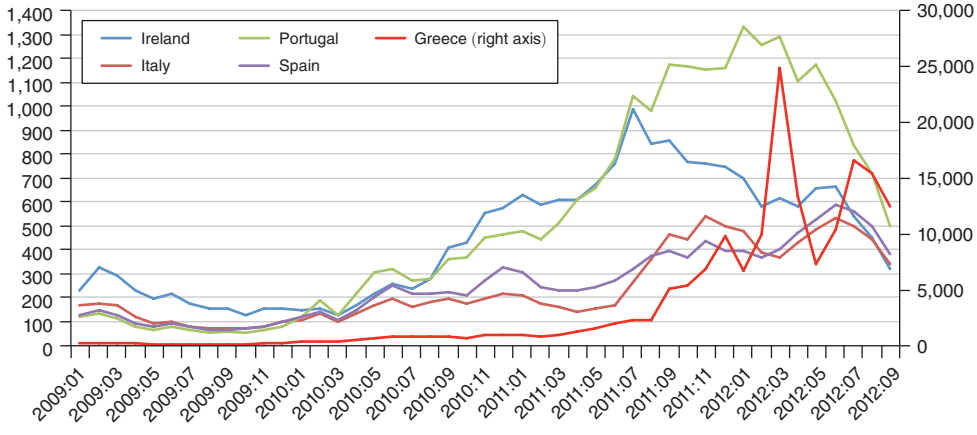

FIGURE 5. MONTHLY AVERAGE CDS SPREAD ON A 10-YEAR SOVEREIGN BOND BY COUNTRY

Note: The figure plots the average monthly CDS spread on a 10-year sovereign bond from January 2009 to September 2012 for Greece, Ireland, Italy, Portugal, and Spain.

Source: Bloomberg

Section IVC that using different definitions of high-risk does not materially alter our results.

While spreads were high in each country during the sovereign debt crisis, there were large fluctuations within the crisis period with respect to the amount of debt each government had to roll over. Such fluctuations are a natural feature of sovereign debt management not limited to crises periods. Figure 4 depicts the amount of sovereign debt that matured during each month between January 2009 and September 2012, as well as during the sovereign debt crisis period (shaded area), for all countries in the sample. The figure shows large month-on-month fluctuations at all times, including during the sovereign debt crisis: for example, the government of Greece needed to roll over €2.6 billion in February 2012 and €22.4 billion the next month; the government of Portugal had to roll over €2.4 billion in May 2012 and €11.4 billion the next month; and the government of Spain had to roll over €24.3 billion in October 2011 and only €6.2 billion the next month. These sharp monthly fluctuations create an exogenous variation in the need of the government to find investors for the bonds it needs to place. Hence, the first ingredient in our identification strategy exploits the idea that if the government needs banks to alleviate its funding pressures by purchasing sovereign bonds, it will be more likely to try to pressure or persuade them during months when it needs to roll over a relatively large amount of debt. This is what we call "high-need" months.

The second element in our identification strategy exploits the idea (as previous studies have done) that some banks are more susceptible to pressure by the domestic government than others. The most obvious distinguishing characteristic of banks that defines their likelihood of being prompted to buy domestic sovereign debt is whether they are domestic or foreign. Domestic banks have a stronger incentive to collude with the government when demand for domestic sovereign

bonds is weak, as an undersubscribed auction would imply higher sovereign spreads, which would directly translate into higher funding costs. Furthermore, they are more likely, at some point, to need assistance from the government and are more vulnerable to explicit or implicit threats if they refuse to cooperate (Romans 1966, Reinhart and Sbrancia 2015). Finally, domestic banks are more likely to feel that it is their "moral" or "patriotic" duty to buy sovereign bonds in times of fiscal stress.

As such, if banks are morally swayed by their own governments, this should imply that during high-need months domestic banks should purchase more domestic sovereign debt compared to foreign banks. Conversely, we expect to see little difference in the behavior of domestic and of foreign banks during low-need months when the government does not need to roll over a large amount of maturing debt and therefore does not need to pressure any subset of banks. This difference should only play up during a period when the sovereign is under severe stress and not during other periods.

Clearly, there are other reasons why—even in the absence of moral suasion—domestic banks would voluntarily choose to purchase more domestically issued sovereign bonds than foreign banks during a period of elevated sovereign stress. For example, they may be betting on their own survival by acquiring a riskier asset portfolio when their sovereign is close to default (Broner et al. 2014, Drechsler et al. 2016). In addition, domestic banks—especially undercapitalized ones—may be pushed to beef up their regulatory capital by the regulator, who holds no similar control over branches of foreign banks. Acquiring more zero-risk sovereign bonds can be one obvious way to achieve this. Furthermore, while not necessarily affecting domestic banks differently from foreign banks, some banks with access to short-term unsecured funding in wholesale markets might be more willing to engage in a carry-trade-type behavior by establishing longer stressed countries' sovereign bond positions, hoping to pocket the spread between long-term bonds and short-term funding costs (Acharya and Steffen 2015). They can also be more sensitive to changes in local economic conditions or credit demand. Finally, (large) domestic banks may act as primary dealers in their own country and as such are more likely to buy a larger share of the newly issued debt.

The crucial advantage of our month-on-month identification strategy is that it allows us to control for these alternative mechanisms. First, we include bank fixed effects that capture any time-invariant differences between banks that affect their net purchase of domestic sovereign debt. By including an interaction between high-need months and the domestic dummy, we control for any dynamics throughout the sample period that might lead domestic banks to purchase more domestic sovereign bonds in high-need months, compared to foreign banks. By including an interaction between high-risk and domestic, we control for a higher propensity of domestic banks to purchase domestic sovereign debt during the sovereign debt crisis because of, for example, risk shifting. To assuage remaining concerns that our results are driven by *monthly* fluctuations in, for example, risk shifting or carry trading, we run in Section IVC additional tests in which we control for monthly changes in banks' incentives to increase their holdings of domestic sovereign debt other than driven by moral suasion.

We model the net purchase of domestic sovereign debt (relative to the stock of domestic sovereign debt in the previous month) by bank i from country j in month t as follows:

$$\begin{aligned}(1)\quad \Delta Domestic\ sovereign\ bonds_{ijt} = {} & \beta_1 High\ risk_{jt} \times High\ need_{jt} \times Domestic_{ij} \\ & + \beta_2 High\ risk_{jt} \times Domestic_{ij} \\ & + \beta_3 High\ need_{jt} \times Domestic_{ij} \\ & + \beta_4 X_{ijt} + \beta_5 \varphi_i + \beta_6 \mu_{jt} + \varepsilon_{ijt},\end{aligned}$$

where $\Delta Domestic\ sovereign\ bonds_{ijt}$ is the bank's net flow of securities issued by the domestic sovereign at time t, divided by the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. $High\ risk_{jt}$ is a dummy variable equal to one in all the months after the country's average CDS spread breaches permanently 300 bps, and to zero before this moment; $High\ need_{jt}$ is a dummy variable equal to one if the total amount of maturing outstanding domestic sovereign debt in country j in month t is above the country median for the sample period, and to zero otherwise; $Domestic_{ij}$ is a dummy variable equal to one if bank i in country j is a domestic bank, and to zero if it is foreign owned; X_{ijt} is a vector of time-varying bank-specific control variables; φ_i is a vector of bank fixed effects; μ_{jt} is a matrix of interactions of country and month dummies; and ε_{ijt} is an i.i.d. error term. The independent effect of the variables $High\ risk_{jt}$, $High\ need_{jt}$, and $Domestic_{ij}$ is not identified because the effect of the first two variables is subsumed in the country-month fixed effects, and the effect of the third variable is subsumed in the bank fixed effects. The model is estimated using OLS, and we cluster standard errors at the bank level to account for the fact that banks' monthly net purchases of domestic sovereign debt are likely correlated over time.

Our coefficient of interest is β_1. In a classical difference-in-difference-in-differences sense, it captures the difference in the net purchase of domestic sovereign debt between high-need and low-need months for domestic banks (the treatment group) relative to foreign banks (the control group) during the high-risk period relative to the low-risk period. A positive coefficient β_1 would imply that—all else equal and relative to foreign banks—domestic banks purchase more domestic sovereign debt in high-need months, compared with low-need months when the sovereign is under pressure. The coefficient β_2 captures the effect of "risk shifting," i.e., the propensity of domestic banks, relative to foreign banks, to increase their holdings of domestic sovereign bonds when the risk of the underlying asset increases. Finally, the coefficient β_3 captures the extent to which domestic banks, relative to foreign banks, are more likely to increase their holdings of domestic sovereign bonds during months when an above-median amount of outstanding domestic sovereign bonds is maturing.

The vector of bank-level controls X_{ijt} allows us to control for a number of time-varying bank-specific factors, including changes in bank size, funding sources, and capital ratios that can impact a bank's decision to purchase domestic sovereign

debt. In order to account for the fact that the effect of accounting variables may not be immediate, we use one-year lags of these variables in the regression. In addition to bank fixed effects, we also include the interaction of country and month fixed effects. This alleviates concerns that our results might be driven by time-varying differences in the demand for sovereign debt or by differences in its quality (at the country level) that affects both domestic and foreign banks equally. Identification therefore comes from comparing the behavior of domestic and foreign banks in the same country during the same month.

II. Data and Descriptive Statistics

The main dataset we employ is the ECB's Individual Balance Sheet Statistics (IBSI) Dataset. This new and unique high-frequency data source contains end-of-month data on assets and liabilities, starting in August 2007, for 247 individual financial institutions in 18 European countries, comprising about 70 percent of the domestic banking sector. The dataset is particularly well suited to our novel identification strategy. First, it captures each individual bank's net purchase of domestic sovereign bonds as well as the stock it holds at a monthly frequency. Second, banks are observed at an unconsolidated level, and therefore the dataset captures both domestic banks and affiliates of foreign banks active in a country. Third, the long time series allows us to compare the sovereign debt period with the period preceding it.

For our analysis, we use 60 banks active in Greece, Ireland, Italy, Portugal, and Spain for which all relevant information is available.[9] We use the bank ownership database of Claessens and van Horen (2015) to determine whether a bank is domestic or foreign owned. Those banks that are not covered by the database (mainly foreign branches) we check manually. A bank is considered foreign if at least 50 percent of its shares are owned by foreigners (a definition commonly used in the literature). We measure ownership at the start of our sample period. Our sample includes 46 domestic and 14 foreign banks, with at least one domestic and one foreign bank active in each of our sample countries.[10]

Our main variable of interest is Δ*Domestic sovereign bonds*, defined as the ratio of the bank's net flow of securities issued by the domestic sovereign at time t to the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. By using the flow and normalizing by the stock, we proxy for the change in total holdings that is due to the purchase of new domestic sovereign debt, and at the same time make sure that we do not overweigh banks with large holdings of domestic sovereign bonds. We trim the variable at 100 percent in either direction to mitigate the impact of potential outliers.

[9] The database covers 77 banks active in these countries, however, we were not able to determine the ownership status of five of them and another 12 banks did not report information on domestic sovereign bond holdings during the sample period (January 2009–September 2012) so we dropped them as well.

[10] Our sample includes 3 domestic and 2 foreign banks in Greece, 4 domestic and 4 foreign banks in Ireland, 18 domestic and 3 foreign banks in Italy, 3 domestic and 2 foreign banks in Portugal, and 18 domestic and 3 foreign banks in Spain.

As bank-specific control variables, we include the total assets of the bank (*Assets*) to capture changes in bank size, and three variables that capture (changes in) bank health or business model that may impact a bank's decision to increase its holdings of domestic sovereign debt: the ratio of deposits to assets (*Deposits*/*Assets*), the ratio of loans to deposits (*Loans*/*Deposits*), and the ratio of bank equity to total assets (*Capital*/*Assets*). All bank-level variables are observed with monthly frequency. All control variables are measured with a 12-month lag.

Data on maturing sovereign debt come from the ECB's Centralized Securities Database (CSDB). This database covers all active and matured securities relevant to the European System of Central Banks, starting in January 2009. It includes each sovereign bond that has been issued and, crucial for our purpose, provides information about its maturity date. This enables us to determine for each country in our sample how much sovereign debt is maturing in each month over the sample period. We define a high-need (low-need) month as a month in which the total amount of maturing debt is above (below) the country median for the sample period. Appendix Tables A1 and A2 provide definitions and sources for all variables used throughout the paper, as well as their summary statistics.

Our identification strategy relies on comparing domestic and foreign banks so it's illustrative to examine how the two bank types compare prior to the sovereign debt crisis. The top panel of Table 1 illustrates the difference with respect to a number of observable balance sheet characteristics. We find that domestic banks are on average larger and have a smaller deposit base, but are not significantly different in terms of their loan to deposit ratio and their capitalization.[11] While not necessarily observationally equivalent across all dimensions, domestic and foreign banks are thus relatively similar across a number of observable characteristics.

In the bottom panel of Table 1, we examine in what way both types of banks differ in their propensity to purchase domestic sovereign bonds. Domestic banks held on average a higher share of their assets in debt securities issued by the domestic government already before the crisis (3.8 percent versus 2.6 percent). However, this difference is not statistically significant indicating that foreign affiliates had comparable holdings of domestic sovereign bonds.[12] We also find that prior to the crisis, there is no statistical difference in the propensity to increase holdings of domestic sovereign bonds between domestic and foreign banks in both low- and high-need months. Finally, we also document a similar pattern between domestic and foreign banks when we compare the bank-specific variation over time in the propensity to

[11] For each variable in Table 1, we first calculate the average per bank over the period before the sovereign debt crisis. We then take the average for the group of domestic and the group of foreign banks.

[12] As further evidence that foreign affiliates hold significant amount of domestic sovereign debt, we also compare the stock of domestic sovereign debt at the foreign affiliate level with the stock of that same debt at the holding level using information from the first EBA stress test (March 2010). That is, we compare the holdings of Spanish debt (as recorded in IBSI) of bank X, which is a subsidiary of bank Y in Spain, with the total holdings of Spanish debt by bank Y reported in the EBA stress test. We find that, on average, the foreign affiliates of the banks included in the EBA stress test hold 43.3 percent of the host-country debt that the group as a whole reported to the EBA. For each individual country, the respective numbers are 7.4 percent in Greece, 7.3 percent in Ireland, 50.1 percent in Italy, 41.6 percent in Spain, and 62.7 percent in Portugal. Unfortunately, we are not at liberty to disclose this information at the individual bank level.

Table 1—Domestic versus Foreign Banks, Pre-sovereign Debt Crisis

Variable	Foreign	Domestic	Difference
Bank-level controls			
log (*Assets*)	10.335	11.033	−0.698
Deposits/Assets	0.606	0.496	0.110
Loans/Deposits	1.156	1.611	−0.456
Capital/Assets	0.108	0.100	0.008
Propensity to purchase domestic sovereign bonds			
Domestic sovereign bonds/Assets	0.026	0.038	−0.012
Δ*Domestic sovereign bonds*	0.018	0.024	−0.006
Δ*Domestic sovereign bonds*, low-need months	0.022	0.032	−0.010
Δ*Domestic sovereign bonds*, high-need months	0.014	0.015	−0.001
std(Δ*Domestic sovereign bonds*)	0.137	0.133	0.004
std(Δ*Domestic sovereign bonds*), low-need months	0.128	0.131	−0.003
std(Δ*Domestic sovereign bonds*), high-need months	0.136	0.125	0.011

Notes: This table presents difference-in-differences estimates from a Mann-Whitney two-sided *t*-test for domestic versus foreign banks. The sample includes 46 domestic and 14 foreign banks in Greece, Ireland, Italy, Portugal, and Spain. Mean values are calculated over a sample period that starts in January 2009 for all countries and ends in December 2009 for Greece, April 2010 for Portugal, August 2010 for Ireland, July 2011 for Spain, and August 2011 for Italy. All variables are observed with monthly frequency. "log(*Assets*)" denotes the natural logarithm of the bank's total assets. "*Deposits/Assets*" denotes the ratio of the bank's total deposits to total assets. "*Loans/Deposits*" denotes the ratio of the bank's total loans issued to total assets. "*Capital/Assets*" denotes the ratio of the bank's equity to total assets. "*Domestic sovereign bonds/Assets*" denotes the ratio of the bank's stock of sovereign bonds issued by the domestic government to the bank's total assets. "Δ*Domestic sovereign bonds*" denotes the ratio of the bank's net flow of sovereign bonds issued by the domestic government at time t to the bank's total holdings of sovereign bonds issued by the domestic government at time $t-1$, for the pre-crisis period. "std(Δ*Domestic sovereign bonds*)" is the standard deviation of "Δ*Domestic sovereign bonds*" for each bank over the respective sample period.

acquire domestic sovereign bonds. This again holds for both low- and high-need months.

The statistical regularities assuage the potential concern with our identification strategy that foreign banks are not a proper control group because few foreign subsidiaries hold sovereign debt issued by the country where they operate, or because they do not respond to new buying opportunities of sovereign bonds in the local market. They also suggest that there is sufficient variation both between and within banks over time.

III. Empirical Evidence

A. *Moral Suasion: Main Result*

The headline results of the paper are reported in Table 2. We estimate three different permutations of equation (1). In column 1, we only include on the right-hand side *High need* × *Domestic* and *High risk* × *Domestic*, as well as bank fixed effects and interactions of country and month dummies. The results show that the net purchase of domestic sovereign debt securities during the crisis period is significantly higher for domestic banks compared to foreign banks. The effect is economically meaningful, too: compared to foreign banks, domestic banks' monthly net increase in domestic sovereign bond holdings is on average 7.9 percentage points higher. Given that any time-invariant home bias by domestic banks is captured by the bank

Table 2—Moral Suasion: Main Results

	Δ*Domestic sovereign bonds*		
	(1)	(2)	(3)
High risk × *High need* × *Domestic*		0.070	0.071
		(0.031)	(0.031)
High risk × *Domestic*	0.079	0.044	0.049
	(0.020)	(0.027)	(0.026)
High need × *Domestic*	0.008	−0.024	−0.027
	(0.013)	(0.021)	(0.021)
log(*Assets*)			−0.006
			(0.025)
Deposits/*Assets*			−0.122
			(0.083)
Loans/*Deposits*			−0.002
			(0.007)
Capital/*Assets*			0.109
			(0.150)
Bank fixed effects	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes
R^2	0.18	0.18	0.18
Number of banks	60	60	60
Observations	2,484	2,484	2,484

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase sovereign bonds issued by the domestic government. The sample includes 46 domestic and 14 foreign banks in Greece, Ireland, Italy, Portugal, and Spain. The sample period is January 2009–September 2012. The dependent variable is the ratio of the bank's net flow of sovereign bonds issued by the domestic government at time t to the bank's total holdings of sovereign bonds issued by the domestic sovereign at time $t-1$. "*High risk*" is a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy). "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period. "*Domestic*" is a dummy variable equal to 1 if the bank is domestically owned. "log(*Assets*)" denotes the natural logarithm of the bank's total assets in million euro. "*Deposits*/*Assets*" denotes the ratio of the bank's total deposits to total assets. "*Loans*/*Deposits*" denotes the ratio of the bank's total loans issued to total assets. "*Capital*/*Assets*" denotes the ratio of the bank's equity to total assets. All bank controls are one-year lagged. All regressions include fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

fixed effects, the coefficient on the variable *High risk* × *Domestic* captures an asset substitution effect whereby domestic banks have a higher average propensity than foreign banks to increase their holdings of domestic sovereign bonds when the risk of the underlying asset is higher (i.e., risk shifting). At the same time, we find that on average, domestic banks are not more likely to load on domestic sovereign bonds during months of elevated government refinancing need.

In column 2, we add the triple interaction *High risk* × *High need* × *Domestic*. The point estimate strongly suggests that during the high-risk period, and relative to foreign banks, domestic banks are significantly more likely to increase their holdings of domestic sovereign bonds during high-need months, compared to low-need months. Importantly, in periods when the sovereign is not under fiscal stress, domestic banks do not have a higher propensity to buy domestic sovereign debt during high-need months. The main effect still obtains when we include one-year

lagged bank-specific balance sheet characteristics, in addition to the bank fixed effects, and the interactions of country and month dummies (column 3). In this specification, we find that banks are on average less likely to increase their holdings of domestic sovereign bonds if they have a higher ratio of deposits to total assets.

Both in columns 2 and 3 of Table 2, the "moral suasion" effect is significant at the 5 percent statistical level and economically large. In the most saturated specification in column 3, the point estimate on β_1 implies that during high-need months, and compared with foreign banks, domestic banks increase their holdings of domestically-issued sovereign debt by 7.1 percentage points more. This corresponds to 0.46 sample standard deviations. Because we control for bank fixed effects, for country $\times$ month fixed effects, and for time-varying bank-specific characteristics, it is unlikely that our results are driven by unobservable time-invariant bank heterogeneity, by country-specific changes in the demand for domestic sovereign debt, or by the propensity of banks to adjust their holdings of domestic sovereign bonds in response to capital or liquidity shocks.[13]

Our results thus strongly suggest that during periods of elevated sovereign stress, when it is potentially difficult for the government to find interested investors, domestic banks are considerably more likely to support their government during months when it needs to roll over a relatively large amount of outstanding debt. Importantly, this moral suasion effect coexists with the risk-shifting effect, and the latter is still significant at the 5 percent statistical level in column 3. However, the risk-shifting effect itself declines by around 40 percent when we control for the moral suasion channel, suggesting that empirical tests which do not properly identify the moral suasion channel will overestimate the extent of risk shifting by banks.

B. *Falsification Tests*

The mechanism that we aim to uncover has two key components: one, it should only take place during times of fiscal stress when the government has trouble (re-)financing its debt; and two, it should only relate to purchases of bonds issued by the domestic sovereign. This allows us to perform a number of falsification tests to ensure we are indeed picking up moral suasion.

In Table 3, we first test for differences in the propensity of domestic versus foreign banks to purchase asset classes other than domestic sovereign bonds in high need months. We find that during the high-risk period, there is no statistical difference in the behavior of domestic and foreign banks in high- versus low-need months with respect to their purchases of *foreign* sovereign bonds (column 1) nor with respect to private securities (column 2).[14] This indicates that variation in governments'

[13] We also estimated the model allowing for the bank fixed effects to differ for the low- and high-risk period. This does not materially affect our results (results available upon request).

[14] Holdings of foreign sovereign bonds relative to assets are on average lower than holdings of domestic bonds, with domestic banks holding 0.4 percent and foreign banks 2.1 percent. Before the crisis, domestic banks held, on average, 6.3 percent of their assets in private securities and foreign banks 8.6 percent. For both asset classes and for both types of banks, there is significant variation both across banks and within banks over time. Importantly, the difference in variation in within-bank net purchases between the two groups of banks is insignificant.

Table 3—Moral Suasion: Falsification Tests

	Δ Foreign sovereign bonds (1)	Δ Private securities (2)	Δ Domestic sovereign bonds, Germany (3)
High risk × *High need* × *Domestic*	0.004	−0.020	0.003
	(0.030)	(0.033)	(0.032)
High risk × *Domestic*	0.012	−0.014	−0.021
	(0.030)	(0.013)	(0.011)
High need × *Domestic*	−0.001	0.017	−0.004
	(0.021)	(0.020)	(0.033)
Bank controls	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes
R^2	0.22	0.20	0.08
Number of banks	47	60	45
Observations	1,662	2,462	1,894

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase government debt securities or to issue loans to sovereigns. The sample includes 38 domestic and 9 foreign banks (column 1); 46 domestic and 14 foreign banks (column 2) in Greece, Ireland, Italy, Portugal, and Spain; and 38 domestic and 7 foreign banks in Germany (column 3). The sample period is January 2009–September 2012. The dependent variable is the ratio of the bank's net flow of sovereign bonds issued by foreign governments at time t to the bank's total holdings of sovereign bonds issued by foreign governments at time $t-1$ (column 1), the ratio of the bank's net flow of securities issued by the private sector at time t to the bank's total stock of securities issued by the private sector at time $t-1$ (column 2), and the bank's net flow of sovereign bonds issued by the domestic government at time t to the bank's total holdings of sovereign bonds issued by the domestic government at time $t-1$ (column 3). "*High risk*" is a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy), or after May 2010 for Germany. "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period. "*Domestic*" is a dummy variable equal to 1 if the bank is domestically owned. All regressions include the rest of the bank-specific variables from Table 2, as well as fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

refinancing needs only affects the extent to which banks purchase domestic sovereign bonds (as documented in Table 2).[15]

As a second falsification test, we estimate the model for 38 domestic and 7 foreign banks active in Germany during the period January 2009–September 2012. We define *High risk* as the period after May 2010 (i.e., the month of the first Greek bailout).[16] During this period, there was ample demand for German bonds. Therefore, even if domestic banks were increasing their holdings of sovereign debt for other reasons, there was no need for the German government to put additional pressure on their banks. Indeed, our results show that in those months when relatively large volumes of German government debt matured, domestic banks did not buy more German sovereign debt relative to foreign banks (column 3).

[15] The evidence further suggests that our results are not contaminated by carry trade-type behavior whereby banks use cheap wholesale funds to buy high-yield government debt. If this was the case, there would be no reason for banks in all five countries to increase their holdings of *domestic* debt, but they would rather go for the riskiest sovereign debt at the time (e.g., Greek government debt).

[16] To make the sample of German banks as comparable as possible to the sample of GIIPS banks, we only include 45 of the available 56 German banks in our dataset. In particular, we drop 9 Landesbanken—government-owned head institutions of all Sparkassen operating in the same state, which are very large compared to the rest—as well as two small regional banks, which are, in terms of assets, smaller than the smallest bank in the GIIPS sample.

We conclude that the phenomenon we document—domestic banks being significantly more likely than foreign banks to increase their holdings of domestic sovereign bonds during months in which the government has relatively larger refinancing needs—only occurs in fiscally stressed countries, and only affects domestically issued sovereign bonds. Therefore, this finding is fully consistent with the occurrence of moral suasion in sovereign debt markets.

C. *Robustness*

Robust High Risk, High Need, and Sample.—The empirical approach we employ throughout the paper rests on distinguishing the behavior of domestic and foreign banks between months with high and months with low refinancing need, under the assumption that any portfolio adjustment will be driven by lack of sufficient investor demand during periods of elevated sovereign stress. This approach makes it necessary to make a clear distinction between periods of high risk and periods of low risk for each country. Our measure of high risk so far is based on a market definition, whereby we have chosen as the start of the high-risk period in each country the month during which the CDS spread on a 10-year government bond permanently breached the 300-bps threshold. To make sure that our results are not driven by this particular choice, we now test whether our results still obtain when we employ alternative definitions of elevated sovereign risk.

First, our measure of high-risk is an absolute measure and assumes that the moment when the perception of the market changes is the same for all five countries. This idea is reasonable given that margin calls are often related to specific hard thresholds. Furthermore, the CDS spreads of the five countries and their volatility were in the run up to the sovereign debt crisis reasonably similar. However, it is equally justifiable to argue that the concept of high-risk should be relative and that one should measure relative changes in the CDS spread within the same country. To capture the concept that the demarcation between low- and high-risk periods varies per country, we use the log of the CDS spread instead of a dummy variable to allow for sovereign risk to change continuously. The estimates reported in Table 4, column 1, show that the moral suasion channel is present regardless of whether we take an absolute or relative measure.

We next employ four alternative definitions of high risk. First, to make sure that our definition of elevated sovereign risk is not driven by one particular market, we assign the start of the high-risk period to the month during which the CDS spread on a 10-year sovereign bond breaches the 300-bps threshold for the first time, regardless of whether it stays above this level or not (column 2). This moves the beginning of the high-risk period all the way to December 2010 in the case of Spain (see Figure 4). Second, we assign the start of the high-risk period to the month in which the yield on a 10-year government bond permanently breached 500 bps for each individual country. Relative to our main definition, the high-risk period now starts one month later in Greece and one month earlier in Italy and in Spain (column 3). Third, we date the high-risk period based on the activation of the ECB's Security Markets Program (SMP) for each individual country (column 4). Under this program, the ECB started purchasing sovereign bonds in secondary markets. The program was activated in

Table 4—Moral Suasion: Robust High Risk and High Government Need

	Δ*Domestic sovereign bonds*								
	log (Average monthly CDS)	First time CDS ≥300bp	Bond yield ≥500bp	SMP dates	High risk after September 2010	Long-term maturing debt	75% cutoff	Share maturing debt	Auctioned debt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
High risk × *High need* × *Domestic*	0.028	0.086	0.070	0.058	0.067	0.062	0.048	0.810	0.051
	(0.015)	(0.040)	(0.041)	(0.035)	(0.045)	(0.031)	(0.028)	(0.308)	(0.031)
High risk × *Domestic*	0.021	0.031	0.034	0.051	0.020	0.061	0.070	0.015	0.074
	(0.013)	(0.031)	(0.031)	(0.026)	(0.034)	(0.023)	(0.025)	(0.038)	(0.029)
High need × *Domestic*	−0.033	−0.037	−0.031	−0.024	−0.031	−0.031	−0.006	−0.707	0.021
	(0.033)	(0.026)	(0.027)	(0.022)	(0.031)	(0.033)	(0.022)	(0.300)	(0.026)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.19	0.18
Number of banks	60	60	60	60	60	60	60	60	60
Observations	2,484	2,484	2,484	2,484	2,484	2,484	2,484	2,484	2,484

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase sovereign bonds issued by the domestic government. The sample includes 46 domestic and 14 foreign banks in Greece, Ireland, Italy, Portugal, and Spain. The sample period is January 2009–September 2012. The dependent variable is the ratio of the bank's net flow of securities issued by the domestic sovereign at time t to the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. "*High risk*" is the (log of the) average monthly CDS spread in column 1; a dummy variable equal to 1 in each month after the monthly CDS spread on a 10-year sovereign bond breaches 300 basis points for the first time (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, December 2010 for Spain, and August 2011 for Italy) in column 2; a dummy variable equal to 1 in all the months after the average monthly yield on a 10-year sovereign bond breaches permanently 500 basis points (i.e., February 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, July 2011 for Spain, and August 2011 for Italy) in column 3; a dummy variable equal to 1 after the activation of the ECB's Securities Markets Program (i.e., May 2010 for Greece, Ireland, and Portugal, and July 2011 for Italy and Spain) in column 4; a dummy equal to 1 after September 2010 in column 5; and a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy) in columns 6–10. "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period columns 1–5; a dummy variable equal to 1 if the amount of maturing sovereign bonds issued by the domestic government with maturity of more than 5 years in a particular month is above the country-specific median for the sample period in column 6; a dummy variable equal to 1 if the total amount of maturing sovereign debt in a particular month is above the country-specific seventy-fifth percentile for the sample period in column 7; the share of maturing debt out of all debt maturing during the current calendar year in column 8; and a dummy variable equal to 1 if the total amount of auctioned sovereign debt in a particular month is above the country-specific median for the sample period in column 9. "*Domestic*" is a dummy variable equal to 1 if the bank is domestically owned. All regressions include the rest of the bank-specific variables from Table 2, as well as fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

May 2010 for Greece, Ireland, and Portugal, and in July 2011 for Italy and Spain. Finally, we assign the same high-risk period to each country, starting in September 2010, the month when the median country in our sample, Ireland, entered a period of elevated sovereign stress according to our main definition (column 5). The evidence from these tests strongly suggests that neither the statistical significance nor the economic magnitude of the "moral suasion" mechanism we documented so far is overly sensitive to how we define country-specific elevated sovereign stress. While in some cases the effect is only significant at the 10-percent statistical level, the evidence is uniformly consistent with the idea that domestic banks are more likely to support the domestic government during periods of sovereign stress, in months when the government is facing high refinancing needs.

We next demonstrate that our results remain robust to alternative choices with respect to our definition of high-need months. Addressing the concern that some governments had to shorten the maturity of the debt auctioned, we show that our results hold when our *High need* variable is based on only maturing long-term bonds, i.e., bonds with a maturity higher than 5 years (column 6). We also find evidence of moral suasion when we define high-need months as those months when the government's refinancing need is in the top country-specific quartile for the sample period, and equal to zero otherwise (column 7). Similarly, our results remain when we replace the *High need* dummy with a continuous treatment variable defined as the fraction of outstanding debt being rolled over in each month (column 8). Finally, while less exogenous than maturing debt, a government's true need to sway banks during a particular month might be more adequately captured by the volume of new debt that is being auctioned. However, due to idiosyncratic shocks (such as a decline in tax revenue), auctioned debt and maturing debt are not perfectly correlated (although its correlation is very high at 0.78). When we reclassify months of high versus low government refinancing need based on the amount of government bonds that are auctioned in each month (column 9), the main result of the paper still obtains (significant at the 10 percent statistical level).

Finally, we show in Table 5 that our results are robust to analyzing different samples. Our results remain largely unaffected when dropping Greece (the country most affected by the crisis, column 1) or Ireland (which did not auction any sovereign bonds between October 2010 and June 2012, column 2). Our results also survive when we drop those country-months when no sovereign debt was auctioned (column 3). To address the concern that the observed patterns are driven by the ECB's two long-term refinancing operations (LTRO) in December 2011 and March 2012, we exclude these two months from the sample period. On these dates, the ECB distributed around €1 trillion to euro area banks in loans of longer than usual maturities at fixed rates. The evidence strongly suggests that the moral suasion effect is not driven by the LTRO, with domestic banks more likely than foreign banks to purchase domestic debt even outside of the months of the two ECB's LTROs (column 4). Finally, we show that the results hold when we estimate our model using a sample that is chosen based on a propensity score matching procedure.[17] We find that even within the matched sample, domestic banks increase their holdings of domestic sovereign bonds relatively more during high-need months (column 5).

Alternative Channels.—Our identification strategy is based on exploiting the fact that during the height of the sovereign debt crisis, there were months during which—because of decisions made by previous governments—governments had to roll over a relatively large amount of debt, and months during which the amount of public debt that needed to be rolled over was relatively low. This strategy allows us to control for both unobservable time-invariant and observable time-varying bank characteristics that can impact the decision of banks to buy sovereign bonds

[17] We calculate a propensity score for each bank's likelihood of being domestic versus foreign, based on pre-crises values of the bank-specific controls that exhibit statistically significant differences across the two groups. We next reduce the sample of domestic banks to the subset that is most similar to the sample of foreign banks.

Table 5—Moral Suasion: Robust Sample

	Δ*Domestic sovereign bonds*				
	Excluding Greece (1)	Excluding Ireland (2)	Excluding no-auction months (3)	Excluding LTRO months (4)	Matched sample (5)
High risk × *High need* × *Domestic*	0.060	0.062	0.070	0.094	0.071
	(0.034)	(0.032)	(0.032)	(0.040)	(0.031)
High risk × *Domestic*	0.062	0.077	0.061	0.032	0.062
	(0.029)	(0.026)	(0.027)	(0.029)	(0.026)
High need × *Domestic*	−0.021	−0.028	−0.025	−0.030	−0.031
	(0.023)	(0.022)	(0.022)	(0.022)	(0.022)
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.18	0.18	0.18	0.18	0.21
Number of banks	55	52	60	60	47
Observations	2,260	2,155	2,338	2,373	1,831

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase sovereign bonds issued by the domestic government. The sample includes 46 domestic and 14 foreign banks in Greece, Ireland, Italy, Portugal, and Spain, unless otherwise specified. The sample period is January 2009–September 2012. The dependent variable is the ratio of the bank's net flow of securities issued by the domestic sovereign at time t to the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. "*High risk*" is a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy). "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period. "*Domestic*" is a dummy variable equal to 1 if the bank is domestically owned. In column 1, all banks from Greece are excluded. In column 2, all banks from Ireland are excluded. In column 3, all country-months with no sovereign bond auctions are excluded. In column 4, the month of the ECB's first three-year LTRO (December 2011) and the month of the ECB's second three-year LTRO (March 2012) are excluded. In column 5, the sample is chosen based on a Propensity Score Matching procedure using pre-crisis values of "log(*Assets*)" and "*Deposits*/*Assets*." All regressions include the rest of the bank-specific variables from Table 2, as well as fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

during the sovereign debt crisis, while at the same time controlling for unobservable time-varying country-specific factors that can impact all banks active in a particular country. However, there can still be lingering concerns related to the possibility that other incentives drive domestic banks to behave differently from foreign banks during high-need months. We address these in Table 6.

The fact that the high-need months are distributed rather randomly over the course of the sample period (Figure 4), suggests that our results are highly unlikely to be driven by a mechanism whereby domestic banks are buying more bonds for regulatory purposes, or are facing shocks to their balance sheet that hit their net worth during the same months when the government's refinancing needs are particularly high. To make sure that this mechanism is indeed not driving our results, we allow the impact of our bank-specific control variables to vary across domestic and foreign banks, both on average and especially during the high-risk period. As can be seen in column 1, the point estimate on the interaction *High risk* × *High need* × *Domestic* hardly changes, confirming the intuition that "moral suasion" is a mechanism independent of the impact of concurrent shocks to banks' balance sheets.

Table 6—Moral Suasion: Alternative Channels

	Δ*Domestic sovereign bonds*					
	Balance sheet shocks (1)	Bank risk (2)	Sovereign risk (3)	Business sentiment (4)	Primary dealers (5)	Foreign banks' suasion (6)
High risk × *High need* × *Domestic*	0.070	0.062	0.070	0.065	0.073	
	(0.031)	(0.032)	(0.031)	(0.033)	(0.032)	
High risk × *Domestic*	0.128	0.067	0.424	0.063	0.041	
	(0.117)	(0.032)	(0.142)	(0.024)	(0.025)	
High need × *Domestic*	−0.031	−0.034	−0.031	−0.027	−0.029	
	(0.022)	(0.018)	(0.021)	(0.022)	(0.023)	
High risk × log(*Assets*) × *Domestic*	−0.015					
	(0.008)					
High risk × *Deposits*/*Assets* × *Domestic*	0.069					
	(0.055)					
High risk × *Loans*/*Deposits* × *Domestic*	0.022					
	(0.005)					
High risk × *Capital*/*Assets* × *Domestic*	0.381					
	(0.236)					
log(*Assets*) × *Domestic*	0.036					
	(0.077)					
Deposits/*Assets* × *Domestic*	−0.043					
	(0.165)					
Loans/*Deposits* × *Domestic*	0.007					
	(0.014)					
Capital/*Assets* × *Domestic*	−0.584					
	(0.261)					
Bank CDS × *Domestic*		−0.001				
		(0.001)				
Bank CDS		0.001				
		(0.001)				

(*continued*)

Another possible confounding mechanism is that a bank's incentive to shift risk might vary over time. While our baseline model allows for domestic banks to have on average a higher propensity to engage in risk shifting, our results can be biased if risk-shifting incentives are higher in high-need months. This could be the case if bank's CDS spreads happen to be elevated during those months. To make sure our results are not driven by this, we add an interaction of *Domestic* with each bank's CDS spread in each particular month (column 2).[18] The estimates indicate that our baseline result is hardly affected.[19]

If governments are perceived by investors to be riskier during months with high refinancing needs, this could be another reason that domestic banks might be more prone to risk shifting in these months. In column 3, we formally test whether this is affecting our results by adding an interaction between the spread on a 10-year

[18] As we do not have information on all banks' CDSs, the number of observations is reduced to 1,753.

[19] Note that the bank fixed effects already pick up the fact that some banks were perceived as riskier than others by the market. Therefore, it is not entirely surprising that a shift in the bank's CDS spread does not have a statistically significant independent effect.

Table 6—Moral Suasion: Alternative Channels (continued)

	Δ*Domestic sovereign bonds*					
	Balance sheet shocks (1)	Bank risk (2)	Sovereign risk (3)	Business sentiment (4)	Primary dealers (5)	Foreign banks' suasion (6)
High risk × 10-year bond yield spread × *Domestic*			−0.077			
			(0.029)			
10-year bond yield spread × *Domestic*			0.075			
			(0.029)			
High risk × Δ Business sentiment index × *Domestic*				0.289		
				(0.083)		
Δ Business sentiment index × *Domestic*				−0.198		
				(0.053)		
High risk × *High need* × *Primary dealer*					0.018	
					(0.027)	
High need × *Primary dealer*					−0.010	
					(0.021)	
High risk × *Primary dealer*					−0.055	
					(0.021)	
High risk × *High need*						−0.017
						(0.026)
High risk						−0.073
						(0.022)
High need						−0.008
						(0.017)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.19	0.23	0.19	0.18	0.19	0.09
Number of banks	60	60	60	60	60	14
Observations	2,484	1,753	2,484	2,155	2,484	567

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase sovereign bonds issued by the domestic government. The sample includes 46 domestic and 14 foreign banks (columns 1–5) and 14 foreign banks (column 6) in Greece, Ireland, Italy, Portugal, and Spain. The sample period is January 2009–September 2012. The dependent variable is the ratio of the bank's net flow of securities issued by the domestic sovereign at time t to the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. "High risk" is a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy). "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period. "*Domestic*" is a dummy variable equal to 1 if the bank is domestically owned. "log(*Assets*)" denotes the natural logarithm of the bank's total assets in million euro. "*Deposits*/*Assets*" denotes the ratio of the bank's total deposits to total assets. "*Loans*/*Deposits*" denotes the ratio of the bank's total loans issued to total assets. "*Capital*/*Assets*" denotes the ratio of the bank's equity to total assets. "Bank CDS" is the bank's own CDS spread. All bank controls are one-year lagged. "10-year bond yield spread" is the spread on a 10-year domestic sovereign bond. "Δ Business sentiment index" denotes the month-on-month change in the country's indicator of business sentiment reported by the European Commission. "*Primary dealer*" is a dummy variable equal to 1 if the bank is certified by the government to participate in government bond auctions. All regressions include the rest of the bank-specific variables from Table 2, as well as fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

domestic sovereign bond and *High risk* × *Domestic*.[20] Our main results remain virtually the same. This is not surprising given that the unconditional correlation between the *High need* dummy and the spread on 10-year government bond yields

[20] In unreported regressions, we control for the domestic sovereign CDS spread instead of bond yields. The main result is unchanged (available upon request).

in our sample is −0.4, suggesting that government default risk is actually *lower* during high-need months.

Another concern is that domestic banks can face lower returns on private investment during high-need months, for example, because of poorer investment opportunities during high-need months, which disproportionately affect domestic banks that likely have stronger ties to the local economy. If so, then domestic banks may have an incentive to move their funds toward domestic sovereign bonds during such months, for reasons unrelated to moral suasion. In column 4, we test formally for this possibility by adding an interaction of *High risk* × *Domestic* with the change in the country-specific Business Sentiment Index published each month by the European Commission. Importantly, the coefficient on the interaction term capturing the "moral suasion" channel is still positive and significant.

It is also possible that domestic banks are serving as primary dealers and, as such, purchase elevated amounts of domestic sovereign debt not because they are pressured by the government, but because they are acting on behalf of non-eligible banks' behest. This is unlikely to drive our results as most primary dealers are foreign rather than domestic banks.[21] Nevertheless, in column 5, we formally control for the possibility that primary dealers might bias our results. This turns out not to be the case.

Finally, we examine whether our results are driven by foreign banks reducing their exposures during high-need months. This could be the case if foreign banks are explicitly asked by their regulators to decrease their holdings of risky foreign sovereign debt especially during high-need months, or because foreign banks price the credit risk embedded in government bonds of stressed countries differently than their domestic peers, especially in months of high refinancing needs. Restricting our sample to foreign banks only, we show that, on average, foreign banks are less likely to purchase domestic sovereign bond during the high-risk period (column 6). Crucially, this behavior does not vary across high-need and low-need months, suggesting that the "moral suasion" channel we document is not driven by foreign banks' pricing sovereign risk differently than domestic banks in high-need months.

IV. Moral Suasion: Mechanisms

We now turn to analyzing the mechanisms driving moral suasion. Ex ante, there are two such mechanisms. First, moral suasion might be a natural reaction to the governance relationship between banks and the government. If banks are connected to the government or are governed by government officials, they are under the government's direct influence and as a result may react to its needs (e.g., Acharya and Steffen 2015, Becker and Ivashina 2018). Second, moral suasion might be the natural reaction of relatively weak banks who either have a strong incentive to keep sovereign spreads from rising too much in order to keep their own funding cost in

[21] We gathered information from websites of the Ministry of Finance in each country and through the European Primary Dealers Handbook in order to determine the certified primary dealers in each country and in each year. Fourteen global banks are certified as primary dealers in at least four of the GIIPS countries.

check or who anticipate the need for government assistance in the near future (but cannot be sure to receive it).

To examine the relative importance of both mechanisms, we test in Table 7 for moral suasion within the sample of domestic banks and create subgroups of banks that are more likely to be swayed, based on the above natural priors. If the "political connections" mechanism is driving moral suasion, its effect will be concentrated in banks that are connected to the government, either through direct ownership or via board relationships. If the "bank health" mechanism is driving moral suasion, banks of worse quality—e.g., poorly capitalized banks or banks with a less stable funding structure—would be the ones driving the result.[22]

To examine the importance of the first mechanism, we construct a number of variables capturing different levels of government control. First, we determine whether a domestic bank is state owned or not, the most direct measure of government influence. We follow De Marco and Macchiavelli (2016) and Altavilla, Pagano, and Simonelli (2017) by denoting a bank as state owned if at least some bank equity is held by the national or local government or by publicly controlled institutions (such as Fondazioni in Italy and Fundaciones and Cajas in Spain).[23] Using this approach, we identify 23 banks as state owned. We also create a continuous measure of this variable, which captures the fraction of the bank's shares held by the local or national government or by publicly controlled institutions.[24] Government ownership is measured at the start of the sovereign debt crisis.

Next, we determine the extent of government support extended to domestic banks during the global financial crisis of 2008–2009 or in its direct aftermath. This information is hand-collected using several sources including the EU Commission State Aid Database. We classify a bank as "supported" if it received any kind of government assistance (e.g., recapitalization, liquidity injection guarantee, etc.) and regardless of the size of the support. All in all, 16 domestic banks in our sample received such support, and there is at least one such bank in each country in our dataset.

Finally, we classify banks based on the political connections of their board. This allows us to capture the fact that board members with past or current affiliation with the government might have a strong influence on the management of a bank even when the bank is not state-owned (see De Marco and Macchiavelli 2016). We use two definitions: the share of the executive board that is or has been politically affiliated with the central government, and the share of the supervisory board that is or has been politically affiliated with the central government. This share ranges from zero in both cases to 86 percent in the case of the executive board and to 41 percent in the case of the supervisory board (see Appendix Table A2).[25]

[22] Focusing only on the group of domestic banks also helps alleviate any residual concerns that foreign banks are not an appropriate control group.

[23] Iannotta, Nocera, and Sironi (2013) uses a stricter definition and only classify a bank as state owned when bank equity is held by the national or local government.

[24] This information is manually collected from banks' annual reports.

[25] We thank Victoria Ivashina for kindly sharing with us her dataset, which (unfortunately for us) only captures banks included in the EBA stress tests.

TABLE 7—MORAL SUASION: MECHANISMS ACROSS DOMESTIC BANKS

	Δ*Domestic sovereign bonds*				
	State owned (dummy) (1)	State owned (continuous) (2)	Supported (3)	Affiliation of executive board (4)	Affiliation of supervisory board (5)
Panel A. Distinguishing across political connections					
High risk × *High need* × *Bank type*	−0.035	−0.079	0.065	−0.146	−0.063
	(0.027)	(0.053)	(0.037)	(0.086)	(0.042)
High risk × *Bank type*	0.034	0.059	−0.057	0.095	0.062
	(0.022)	(0.041)	(0.026)	(0.042)	(0.109)
High need × *Bank type*	0.040	0.082	−0.017	0.071	−0.013
	(0.018)	(0.031)	(0.024)	(0.073)	(0.111)
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.22	0.22	0.22	0.14	0.13
Number of banks	46	46	46	18	18
Observations	1,961	1,961	1,961	715	715

	Δ*Domestic sovereign bonds*						
	Low log(*Assets*) (1)	Low tier 1/*Assets* (2)	Low tier 1 + 2/ *Assets* (3)	Low liquid assets/ *Assets* (4)	High *Loans*/ *Deposits* (5)	High NPLs/ *Assets* (6)	High *domestic sovereign bonds*/*Assets* (7)
Panel B. Distinguishing across bank health							
High risk × *High need* × *Bank type*	0.066	0.072	0.049	0.055	−0.027	−0.016	0.042
	(0.026)	(0.034)	(0.034)	(0.034)	(0.038)	(0.032)	(0.036)
High risk × *Bank type*	−0.014	−0.058	−0.045	−0.034	0.026	0.037	−0.075
	(0.023)	(0.027)	(0.024)	(0.024)	(0.027)	(0.027)	(0.030)
High need × *Bank type*	−0.048	−0.055	−0.025	−0.039	0.032	0.003	−0.009
	(0.017)	(0.021)	(0.023)	(0.023)	(0.024)	(0.020)	(0.023)
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Number of banks	46	46	46	46	46	46	46
Observations	1,916	1,916	1,916	1,916	1,916	1,916	1,916

(*continued*)

To test the impact of the "bank health" mechanism, we construct a number of balance sheet variables. As balance sheet data in IBSI are limited, we download additional (annual) balance sheet data from Bankscope for the domestic banks in the dataset. We focus on variables that are accepted empirical proxies for bank health and net worth: total assets, Tier 1 and Tier 2 capital, the ratio of liquid assets to total assets, the ratio of loans to deposits, and the ratio of nonperforming loans (NPLs) to total assets.[26] In addition, we also use information from IBSI on each bank's holdings of domestic sovereign bonds to total assets. For each variable we use its value as of end-2009, before the eruption of the sovereign debt crisis in Greece. We then create dummy variables equal to one whenever the value of the respective balance sheet variable is below the sample median (in the case of

[26] Total assets and loan-to-deposit ratio are also available in IBSI, but to assure consistency between the different bank characteristics, we categorize banks according to the different balance sheet items as provided by Bankscope.

Table 7—Moral Suasion: Mechanisms across Domestic Banks (*continued*)

	Δ*Domestic sovereign bonds*				
	(1)	(2)	(3)	(4)	(5)
Panel C. Horse race					
High risk × *High need* × Supported	0.075	0.047	0.055	0.065	0.062
	(0.034)	(0.037)	(0.037)	(0.035)	(0.038)
High risk × *High need* × Low log(*Assets*)	0.077				0.054
	(0.027)				(0.032)
High risk × *High need* × Low Tier 1/*Assets*		0.063			0.043
		(0.036)			(0.033)
High risk × *High need* × Low Tier 1 + 2/*Assets*			0.039		0.007
			(0.035)		(0.037)
High risk × *High need* × Low liquid assets/*Assets*				0.057	0.028
				(0.033)	(0.036)
Bank controls	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Country × Month fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.22	0.22	0.22	0.22	0.22
Number of banks	46	46	46	46	46
Observations	1,916	1,916	1,916	1,916	1,916

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase sovereign bonds issued by the domestic government. The sample includes 46 domestic banks in Greece, Ireland, Italy, Portugal, and Spain. The sample period is January 2009–September 2012. The dependent variable is the ratio of the bank's net flow of securities issued by the domestic sovereign at time t to the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. "*High risk*" is a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy). "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period. In panel A, "*Bank type*" is a dummy variable equal to 1 if the bank is state-owned (column 1); the share of bank equity held by the government or by public entities (column 2); a dummy equal to 1 if the bank received government support during the financial crisis of 2008–2009 (column 3); the share of the bank's executive board that is politically affiliated with the federal government (column 4); and the share of the bank's supervisory board that is politically affiliated with the federal government (column 5). In panel B, "*Bank type*" is a dummy variable equal to 1 if in 2009, the bank had below-sample-median assets (column 1); a below-sample-median ratio of Tier 1 capital to total assets (column 2); a below-sample-median ratio of Tier 1 + Tier 2 capital to total assets (column 3); a below-sample-median ratio of liquid assets to total assets (column 4); an above-sample-median ratio of loans to deposits (column 5); an above-sample-median ratio of nonperforming loans to total assets (column 6); and an above-sample-median ratio of domestic sovereign securities to total assets (column 7). All regressions include the rest of the bank-specific variables from Table 2, as well as fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

assets, Tier 1 capital, Tier 1 + Tier 2 capital, and liquid assets) or above the sample median (in the case of loans to deposits, NPLs, and sovereign bond holdings), and to zero otherwise. Therefore, in each case, a value of one corresponds to a weaker bank that can plausibly face a higher recapitalization need in the future or is more vulnerable to an increase in its funding costs, but may not necessarily be assured of future government assistance (given, for example, its small asset size).

We then replicate model (1), entering each of the above dummies one at a time in the place of $Domestic_{ij}$, in the sample of domestic banks. We test the "political connection" mechanism in panel A of Table 7. We first compare state-owned banks to private domestic banks during high-need versus low-need months, in terms of their propensity to increase their holdings of domestic sovereign bonds. The data suggest that state-owned banks are statistically not more likely to do so. Whether we measure state ownership as a dummy (column 1) or as a continuous variable (column 2) does not make a difference.

However, when we compare supported to nonsupported domestic banks, we find that the former are strictly more likely to purchase domestic sovereign bonds during high-need months compared to private banks that did not receive government support during the crisis (column 3). This exercise partially explains the null result in columns 1 and 2, which is plausibly driven by the fact that privately owned supported banks are likely to face pressure from the government, too. Furthermore, we find that the extent of political affiliation of neither the bank's executive board (column 4) nor the bank's supervisory board (column 5) helps explain the "moral suasion" effect that we documented in Table 2. The evidence in panel A of Table 7 thus suggests that while the government's influence as a result of bank assistance during the financial crisis is a perceptible driver of bank behavior consistent with "moral suasion," political connections on their own are not.

The estimates reported in panel B of Table 7 suggest that for a number of empirical proxies for bank vulnerability, weaker domestic banks are more likely to increase their purchases of domestic sovereign bonds during months in which the government is facing higher refinancing needs. In particular, this is the case for smaller banks (column 1), for less well capitalized banks (columns 2 and 3), and for banks with a lower ratio of liquid to total assets (column 4). We do not document any difference between the two groups of domestic banks along the dimension of loans to deposits, NPLs, or their pre-crisis exposure to domestic sovereign bonds.

Finally, in panel C of Table 7, we run a series of regressions where we juxtapose the effect of the bank-specific variables, which turned out to have a significant impact on bond buying in panels A and B. We do so by including the dummy for whether a bank was supported or not alongside each of the four significant balance sheet variables (size, Tier 1, Tier 1 + 2, and the ratio of liquid-to-total assets), first adding them one at a time (columns 1–4) and then in a horse race (column 5). The evidence strongly supports the notion that both political pressure through government support and balance sheet weakness are a first-order determinant of banks' willingness to accommodate the domestic government's financing needs. Therefore, the "moral suasion" motive is not exhibited by all domestic banks equally, but is only present for those domestic banks that received government assistance in the past, or are weak and thus plausibly hope to benefit from government assistance in the future. At the same time, the governance of banks played less of a role.

V. Aggregate Effect and Duration

Our results raise two broad questions regarding the aggregate economic effect and the duration of the effect. The first question asks how much additional balance sheet risk a domestic bank is taking on because of the moral suasion mechanism that we documented. The triple interaction parameter and the double interaction parameter in Table 2, column 3, allow us to perform a back-of-the-envelope calculation in order to determine the estimated increase in the stock of domestic sovereign debt due to moral suasion, relative to the increase in the stock of domestic sovereign debt due to risk shifting. As 49 percent of the months during the crisis period are high-need months, and as only the risk-shifting channel is operational during both high- and low-need months, the coefficient on the triple interaction suggests that on

average, the propensity to increase the holdings of domestic sovereign bonds relative to total assets due to moral suasion was higher by 0.035 (the parameter estimate 0.071 divided by two). The coefficient on the double interaction implies that on average, the propensity to increase the holdings of domestic sovereign bonds relative to total assets due to risk shifting was higher by 0.049. The two forces combined give a propensity that domestic banks increase their holdings of domestic sovereign bonds relative to total assets during the high-risk period by 0.084 on a month-on-month basis.

The average (domestic) bank in the sample spends 18.6 months in a stress period, and so its holdings of domestic sovereign bonds relative to total assets increase by 156 percent, out of which 65 percent is due to moral suasion and 91 percent due to risk shifting. This corresponds to the holdings of domestic sovereign bonds, as a share of total assets, by the median GIIPS bank in the sample increasing from 3.8 percent to 6.3 percent due to moral suasion. Alternatively, at the beginning of the stress period, the average bank in our GIIPS sample held €3.9 billion worth of domestic sovereign bonds, and so the 46 domestic banks in our dataset held collectively €179.4 billion worth of domestic sovereign bonds. Our point estimates imply that their overall holdings of domestic sovereign bonds increased by €116.6 billion due to moral suasion. Clearly, these estimates understate the aggregate effects of moral suasion on domestic sovereign bond holdings because the banks in our sample account for about 70 percent of the overall domestic market.

The second question asks how persistent the moral suasion effect is. Ex ante one would expect the moral suasion effect to subside quickly after the sovereign stress disappears. After all, governments only need to pressure their banks when they face the risk of an undersubscribed government bond auction. One would therefore expect the effect to disappear quickly after the announcement of the OMT Program. In addition, testing the persistence of the moral suasion effect is also complicated by the fact that other factors came into play in the period after Draghi's speech and the OMT announcement that affected banks' incentives to buy domestic sovereign debt. For example, as shown by Fiordelisi, Ricci, and Stentella Lopes (2017), the Asset Quality Review and the establishment of the SSM and the Banking Union incentivized European banks, including GIIPS banks, to buy more (domestic) sovereign debt in order to window-dress their balance sheet ahead of the review. As these programs were already announced at the end of 2012, it is hard to say what drives banks' holding of sovereign debt after the OMT announcement.

However, to offer some indication as to whether the moral suasion effect persists, Table 8 reports the estimates from an additional test whereby we extend the sample period to June 2013, and include in our main model an additional triple interaction of *Domestic* with *High need* and a *Post-OMT* dummy, which is equal to 1 after September 2012, and to 0 otherwise. We find that while the crisis period exhibits a strong moral suasion pattern, both relative to the pre-crisis and relative to the post-crisis period, there is no difference in the behavior of domestic and of foreign banks, in high- versus low-need months after the announcement of the OMT program. Our results thus suggest that as expected, the effects we record are not permanent and that this type of behavior ceases once sovereign risk declines.

Table 8—Moral Suasion: Duration Analysis

	Δ*Domestic sovereign bonds*
High risk × *High need* × *Domestic*	0.056
	(0.031)
High risk × *Domestic*	0.052
	(0.024)
High need × *Domestic*	−0.009
	(0.022)
Post-OMT × *High need* × *Domestic*	−0.010
	(0.026)
Post-OMT × *Domestic*	0.032
	(0.030)
Bank controls	Yes
Bank fixed effects	Yes
Country × Month fixed effects	Yes
R^2	0.18
Number of banks	60
Observations	2,999

Notes: This table presents difference-in-differences estimates of the propensity of banks to purchase sovereign bonds issued by the domestic government. The sample includes 46 domestic and 14 foreign banks in Greece, Ireland, Italy, Portugal, and Spain. The sample period is January 2009–June 2013. All variables are observed with monthly frequency. The dependent variable is the ratio of the bank's net flow of securities issued by the domestic sovereign at time t to the bank's total holdings of securities issued by the domestic sovereign at time $t-1$. "*High risk*" is a dummy variable equal to 1 in all the months after the country's average CDS spread breaches permanently 300 basis points (i.e., January 2010 for Greece, May 2010 for Portugal, September 2010 for Ireland, August 2011 for Spain, and September 2011 for Italy). "*High need*" is a dummy variable equal to 1 if the amount of maturing domestic sovereign bonds in a particular month is above the country-specific median for the sample period. "*Post-OMT*" is a dummy variable equal to 1 after September 2012. "*Domestic*" is a dummy variable equal to 1 if the bank is domestically owned. All regressions include the rest of the bank-specific variables from Table 2, as well as fixed effects as specified. Standard errors clustered at the bank level appear in parentheses.

VI. Conclusion

Using a novel identification strategy in combination with a unique new high-frequency dataset of monthly securities holdings by 60 banks in Greece, Ireland, Italy, Portugal, and Spain, we show that during the European sovereign debt crisis, domestic banks—and in particular, banks that received government support during the financial crisis and banks that might need (but are not assured) to receive it in the future—were considerably more likely than foreign banks to increase their holdings of domestic sovereign debt in months when their government needed to roll over a large amount of maturing debt. These findings show that governments sway their domestic banks to buy domestic sovereign bonds during periods when the supply of such bonds exceeds the demand for them (moral suasion).

Our results inform the policy debate surrounding the "deadly embrace" between sovereigns and banks. First, our findings show that banks and sovereigns can and do collude in times of fiscal stress. This can help stabilize the system at a moment when many other players (i.e., foreign banks and insurance companies, asset managers, money market funds, etc.) are retreating from the market. That is, domestic banks can and do act as a "buyers of last resort" for their sovereigns' debt, reducing fiscal

stress by stabilizing yields and spreads. This is especially beneficial when markets are overreacting as it lowers the risk of self-confirming expectations.

However, this comes at a cost, as it reinforces the link between banks and their sovereigns in a period when sovereign bond spreads are already high. This increases the risk on the banks' balance sheets, which in turn heightens systemic risk. To reduce this risk, some change in regulation is warranted. An obvious first step is to reduce the chance that banks need to be bailed out by their governments. To this end, the introduction of higher capital ratios and the establishment of the European Banking Union with a common supervision and resolution system are important steps forward to break the sovereign bank "doom loop" and reduce the scope for moral suasion.

At the same time, as long as governments rely to a large extent on domestic banks for financing and banks have clear incentives to purchase sovereign debt for its favorable credit and liquidity characteristics and its use as collateral, common supervision and resolution will not be enough to break the sovereign-bank "doom loop." Therefore, to reduce the potential disruptive effect of large holdings of (domestic) sovereign debt on banks' balance sheets, a number of proposals for regulatory reform, which can complement the Banking Union, have been put forward.[27] These include introducing a positive risk weight on sovereign debt and/or applying large exposure limits similar to those on holdings of other asset classes. These regulatory reforms should enhance banks' incentives to take sovereign risk into account and limit systemic risk at an EU-wide level, while at the same time allow banks to continue playing their market-maker and stabilizing roles in sovereign debt markets. Furthermore, the issuance of European Safe Bonds, as envisioned by Brunnermeier et al. (2017), could play a role to the extent that their issuance would correspond adequately enough in time and volume with high funding needs in crisis-hit countries. We leave the further exploration of their role to future research.

[27] See for example, ESRB report on the regulatory treatment of sovereign exposures (March 2015) or Viral Acharya on the "Banking Union in Europe and other reforms," *VoxEU*, October 16, 2012.

Appendix

Appendix Table A1—Variables: Definitions and Sources

Variable	Definition	Source
Bank-level variables, all banks		
Domestic	Dummy variable equal to 1 if the bank is domestically owned, and to 0 otherwise.	CvH
Δ*Domestic sovereign bonds*	The ratio of the bank's net flow of sovereign bonds issued by the domestic government at time t to the bank's total holdings of sovereign bonds issued by the domestic government at time $t-1$.	IBSI
Δ Foreign sovereign bonds	The ratio of the bank's net flow of sovereign bonds issued by foreign governments at time t to the bank's total holdings of sovereign bonds issued by foreign governments at time $t-1$.	IBSI
Δ Private securities	The ratio of the bank's net flow of securities issued by the private sector at time t to the bank's total holdings of securities issued by the private sector at time $t-1$.	IBSI
Assets (millions)	The bank's total assets, in million euro.	IBSI
Deposits/*Assets*	The ratio of the bank's total deposits to total assets.	IBSI
Loans/*Deposits*	The ratio of the bank's total loans issued to total assets.	IBSI
Capital/*Assets*	The ratio of the bank's equity to total assets.	IBSI
Domestic sovereign bonds/*Assets*	The ratio of the bank's holdings of sovereign bonds issued by the domestic government to total assets.	IBSI
Bank CDS	The bank's CDS spread.	Bloomberg
Bank-level variables, domestic banks		
State owned	Dummy variable equal to 1 if a domestic bank is state owned, and to 0 otherwise.	CvH
Supported	Dummy variable equal to 1 if a domestic bank received government support during the financial crisis, and to 0 otherwise.	CvH
State owned or supported	Dummy variable equal to 1 if a domestic bank is state owned or received government support during the financial crisis, and to 0 otherwise.	CvH
Share affiliated executive board	The share of the executive board of a domestic bank that is politically affiliated with the federal government.	Boardex
Share affiliated supervisory board	The share of the supervisory board of a domestic bank that is politically affiliated with the federal government.	Boardex
Primary dealer	Dummy variable equal to 1 if a bank is a designated primary dealer in government bond auctions, and to 0 otherwise.	MFs, EPDH
log(*Assets*) (2009)	Logarithm of the bank's total assets in 2009.	Bankscope
Tier 1/*Assets* (2009)	The ratio of the bank's Tier 1 capital to total assets in 2009.	Bankscope
Tier 1 + 2/*Assets* (2009)	The ratio of the bank's Tier 1 and Tier 2 capital to total assets in 2009.	Bankscope
Liquid assets/*Assets* (2009)	The ratio of the bank's liquid assets to total assets in 2009.	Bankscope
Loans/*Deposits* (2009)	The ratio of the bank's loans to deposits in 2009.	Bankscope
NPLs/*Assets* (2009)	The ratio of the bank's nonperforming loans to assets in 2009.	Bankscope
Domestic sovereign bonds/*Assets* (2009)	The ratio of the bank's holdings of sovereign bonds issued by the domestic government to total assets in 2009.	IBSI
Country-level variables		
Sovereign CDS spread	The CDS spread on the country's 10-year sovereign bonds in a month.	Bloomberg
Δ Business sentiment index	The month-on-month change in the country's indicator of business sentiment reported by the European Commission.	EC
Maturing debt (millions)	The amount of existing government debt that is maturing in a month.	CSDB
Auctioned debt (millions)	The amount of newly issued government debt in a month.	CSDB
10-year bond yield spread	The difference between the yield on a 10-year spread in a particular country and the yield on a German bund in a month.	Bloomberg

Notes: "CvH" is Claessens and van Horen (2015). "IBSI" is the ECB's Individual Balance Sheet Statistics Dataset. "MFs" is Ministries of Finance. "EPDH" is the European Primary Dealers Handbook. "EC" is the European Commission. "CSDB" is the ECB's Centralized Securities Database.

Appendix Table A2—Summary Statistics

Variable	Mean	Median	SD	Min	Max
Bank-level variables, all banks					
Domestic	0.68	1.00	0.47	0.00	1.00
Δ*Domestic sovereign bonds*	0.03	0.00	0.15	−0.83	0.99
Δ Foreign sovereign bonds	−0.02	0.00	0.18	−0.99	0.88
Δ Private securities	−0.01	−0.01	0.12	−0.98	0.99
Assets (millions)	77,810.73	45,531.00	93,508.70	933.00	533,849.00
Deposits/*Assets*	0.54	0.52	0.20	0.00	1.08
Loans/*Deposits*	1.50	1.35	1.13	0.25	10.00
Capital/*Assets*	0.10	0.09	0.07	0.00	0.60
Domestic sovereign bonds/*Assets*	0.04	0.03	0.05	0.00	0.27
Bank CDS	372.41	224.47	400.54	22.12	3,884.53
Bank-level variables, domestic banks					
State owned	0.48	0.00	0.50	0.00	1.00
Supported	0.42	0.00	0.49	0.00	1.00
State owned or supported	0.67	1.00	0.47	0.00	1.00
Share affiliated executive board	0.12	0.00	0.24	0.00	0.86
Share affiliated supervisory board	0.19	0.16	0.13	0.00	0.41
Primary dealer	0.23	0.00	0.42	0.00	1.00
log(*Assets*) (2009)	18.54	18.42	1.09	17.16	21.19
Tier 1/*Assets* (2009)	0.09	0.09	0.01	0.07	0.12
Tier 1 + 2/*Assets* (2009)	0.11	0.11	0.01	0.09	0.15
Liquid assets/*Assets* (2009)	0.16	0.12	0.10	0.04	0.57
Loans/*Deposits* (2009)	1.67	1.61	0.46	0.83	3.02
NPLs/*Assets* (2009)	0.04	0.04	0.03	0.01	0.11
Domestic sovereign bonds/*Assets* (2009)	0.03	0.03	0.03	0.00	0.14
Country-level variables					
Sovereign CDS spread	661.33	271.59	2,197.63	58.01	25,960.76
Δ Business sentiment index	0.02	0.02	0.18	−1.07	0.62
Maturing debt (millions)	16,283.67	9,839.02	14,961.30	0.00	62,721.70
Auctioned debt (millions)	16,172.99	14,347.10	13,324.04	0.00	46,620.11
10-year bond yield spread	6.43	5.46	4.41	3.83	48.60

Notes: This table presents summary statistics for the variables used in the empirical tests. The sample includes 46 domestic and 14 foreign banks in Greece, Ireland, Italy, Portugal, and Spain. The sample period is January 2009–September 2012. All variable definitions and their sources can be found in Appendix Table A1.

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